

Abstract Submitted
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Spectral analysis of argon emission in the ALEXIS plasma column¹ N. IVAN ARNOLD, CONNOR BALLANCE, STUART LOCH, EDWARD THOMAS, Auburn University — Performing spectroscopic measurements of emission lines in relatively cold laboratory plasmas is challenging because the plasma is often neutral-dominated and is not in thermal equilibrium. However, these types of plasma do offer a unique opportunity for benchmarking the fundamental atomic data. We report on new level-resolved calculations for the dielectronic recombination and collisional excitation of the low charge states of argon. The dielectronic recombination results are compared with existing configuration-average distorted-wave results and semi-empirical calculations. The collisional excitation rates are used to generate synthetic spectra, which are compared to experimental observations. The new dielectronic recombination and collisional excitation rate coefficients, along with existing ionization rate coefficients, are processed into metastable-resolved effective ionization and recombination rate coefficients. These are then used in non-equilibrium ionization balance modeling of an argon plasma experiment on the Auburn ALEXIS facility. We outline plans to use our atomic model to interpret the ALEXIS experiment, and overview the future direction of this project.

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